

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,167,032 B1
APPLICATION NO. : 10/815403
DATED : January 23, 2007
INVENTOR(S) : Danny S. Barlow

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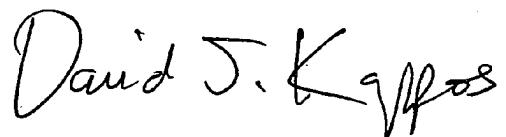
It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

The Title page, showing an illustrative figure, should be deleted and substitute therefor the attached title page.

Delete 3 Formal Drawing sheets 1, 3 and 4, for Figure 1, Figure 3A, and Figure 3B and substitute therefor the Drawing sheets, consisting of figs. 1, 3A-3B as shown on the attached pages.

Signed and Sealed this

Twenty-second Day of September, 2009



David J. Kappos
Director of the United States Patent and Trademark Office

(12) United States Patent
Barlow(10) Patent No.: US 7,167,032 B1
(45) Date of Patent: Jan. 23, 2007

(54) SELF-ADJUSTING SCHMITT TRIGGER

(75) Inventor: Danny S. Barlow, South Jordan, UT (US)

(73) Assignee: Lattice Semiconductor Corporation, Hillsboro, OR (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 10/815,403

(22) Filed: Mar. 31, 2004

(51) Int. Cl.
H03K 3/12 (2006.01)

(52) U.S. Cl. 327/205

(58) Field of Classification Search 327/205, 327/206, 208, 210
See application file for complete search history.

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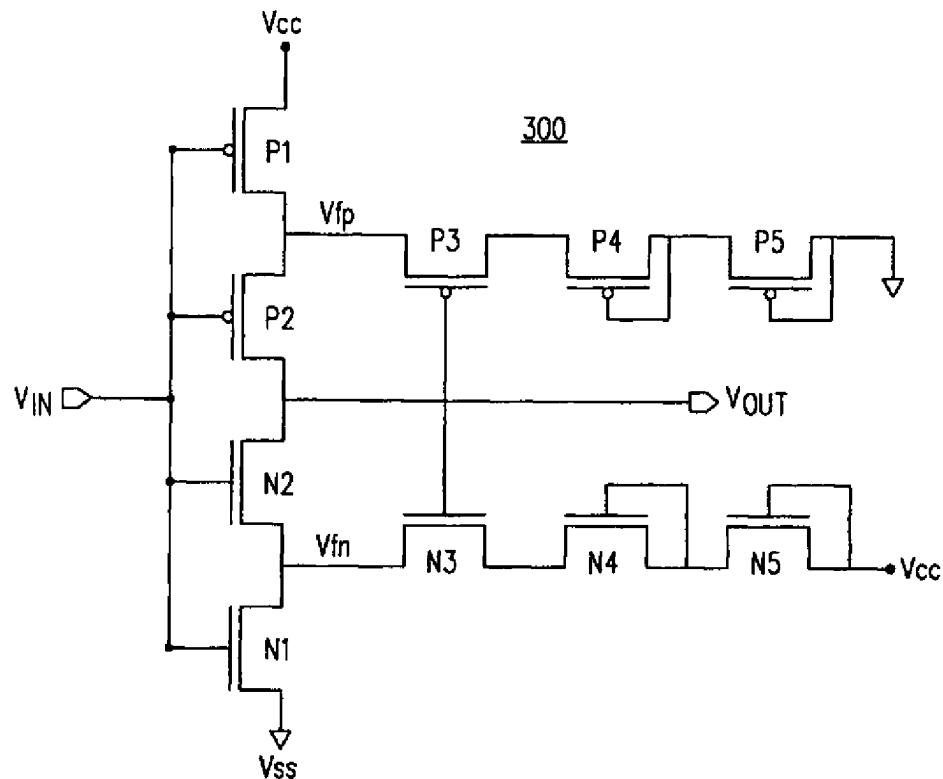
Primary Examiner—My-Trang Nu Ton

(74) Attorney, Agent, or Firm—MacPherson Kwok Chen & Heid LLP; Jonathan W. Hallman

(57) ABSTRACT

A Schmitt trigger includes a PMOS transistor and an NMOS transistor, each having a gate coupled to an output voltage terminal. The Schmitt trigger is configured such that an input voltage that switches on the PMOS transistor determines a low voltage threshold and an input voltage that switches on the NMOS transistor determines a high voltage threshold. By coupling devices such as diodes to either or both of the PMOS and NMOS transistors, a margin between the low voltage threshold and ground and between the high voltage threshold and a supply voltage are maintained as the supply voltage is reduced. In addition, hysteresis is maintained or increased as supply voltage is increased.

19 Claims, 5 Drawing Sheets



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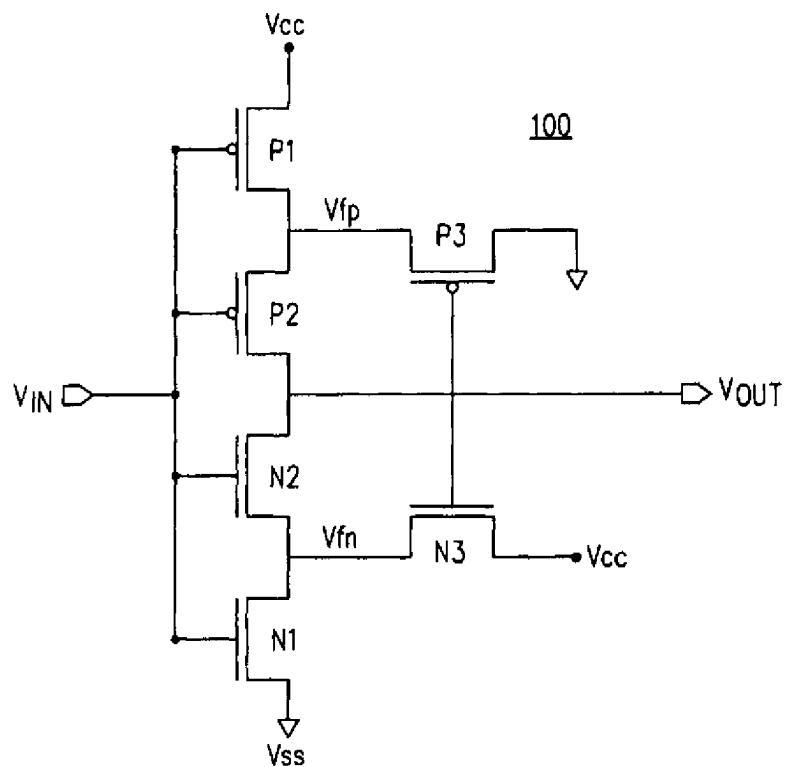


FIG. 1
(PRIOR ART)

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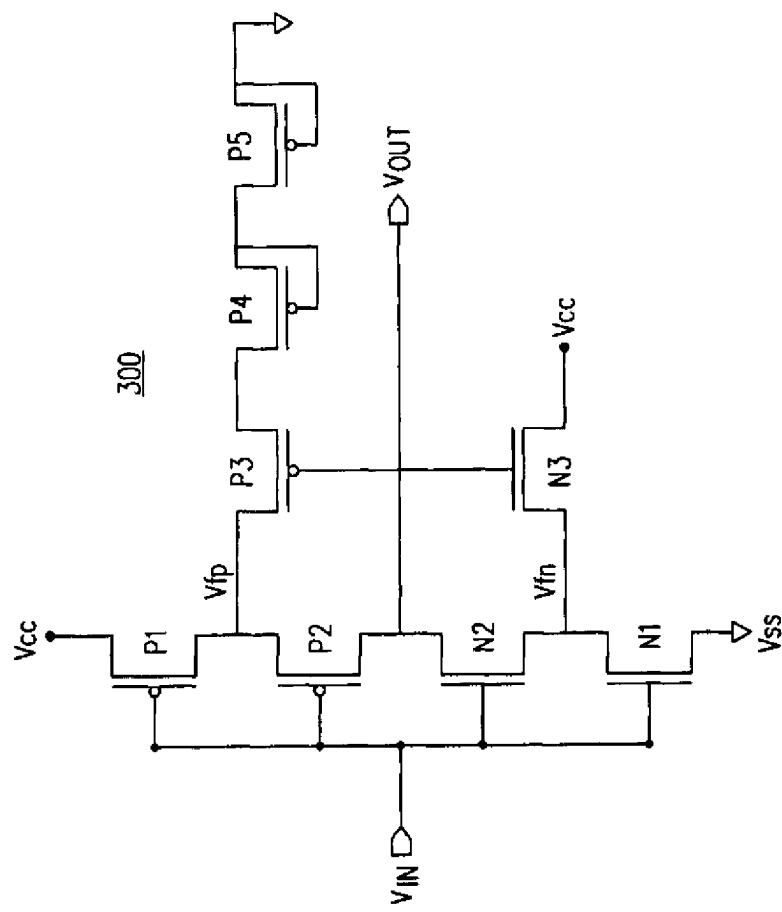


FIG. 3A

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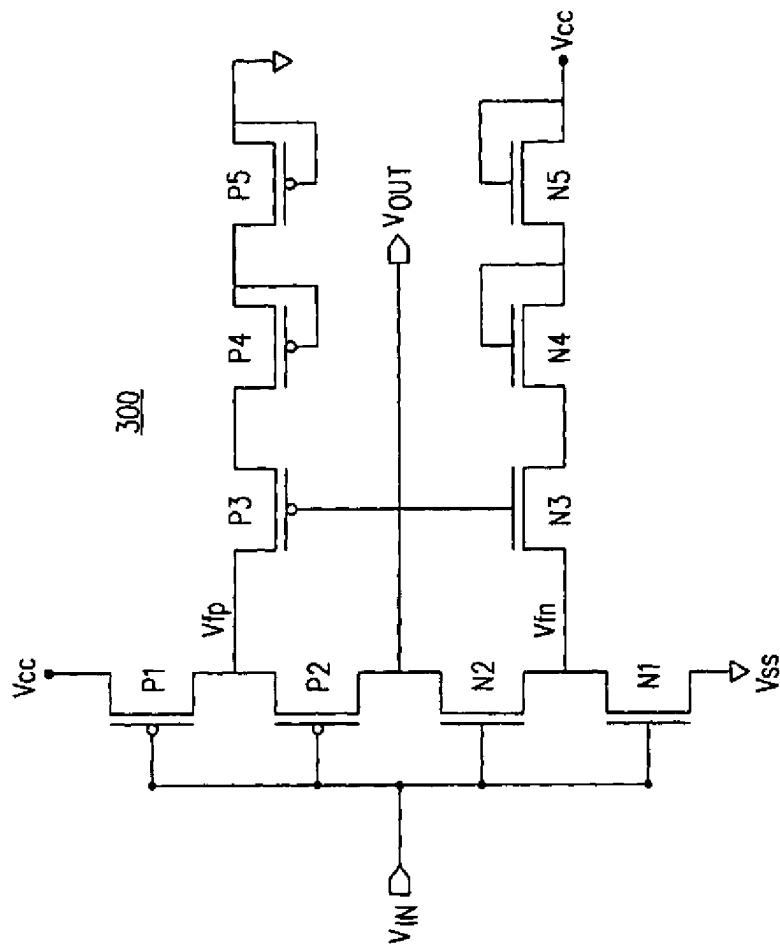


FIG. 3B